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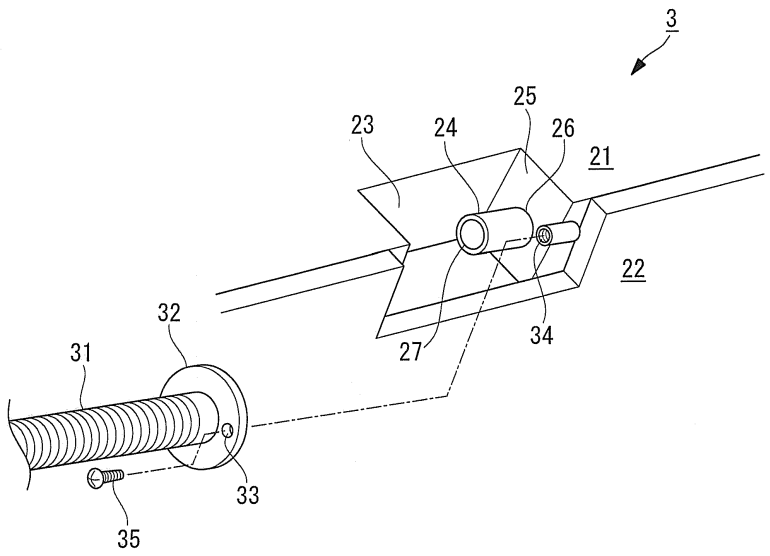
(54) INTEGRATED AIR CONDITIONER

(57) An integrated air conditioner is provided, which includes a drain pan 3 configured to store drain water drained from an indoor unit or an outdoor unit, and a hose socket 24 configured to connect the drain pan 3 to a drain hose 31 through which drain water is drained. The drain pan 3 has a recess 23 formed extending over a bottom surface 22 and a back surface 21 of the drain pan 3. In the recess 23, the hose socket 24 is obliquely disposed along a straight line which is non-parallel to the normal to the back surface 21. According to the integrated air conditioner described above, the drain hose 31 can be, under various situations, properly placed on the drain pan 3 so as not to protrude from either of the bottom surface 22 or the back surface 21.

FIG. 6



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Description

{Technical Field}

[0001] The present invention relates to an integrated air conditioner configured such that an indoor unit and an outdoor unit are integrated together.

{Background Art}

[0002] Integrated air conditioners have been known, each of which is configured such that an indoor unit and an outdoor unit are integrated together. The indoor unit includes an indoor air flow path through which indoor air sucked into the indoor unit through an air suction port is discharged to a room through an air discharge port in way of an indoor heat exchanger and an indoor fan. The outdoor unit discharges outdoor air sucked into the outdoor unit through an outdoor air suction port to the outside of the room in way of an outdoor fan and an outdoor heat exchanger. In recent years, the integrated air conditioners perform an air-heating operation using a heat pump, and drain water disposal on an indoor side is required for the air-heating operation.

{Citation List}

{Patent Literature}

[0003] {PTL 1}
Japanese Unexamined Utility Model Application, Publication No. H01-100031

{Summary of Invention}

{Technical Problem}

[0004] Typically, as described in, e.g., PTL 1, the integrated air conditioner further includes a drain pan configured to receive drops of water separated from air by the indoor unit or the outdoor unit, and the method of drawing a drain hose of the drain pan exactly backward from a unit back surface to the outside of the room is employed. When a drain hose drawing port of the drain pan faces exactly backward as just described, it is sometimes difficult to perform drain hose connection required for drain water disposal on the indoor side. It is necessary to place the drain hose at a proper position depending on the situation where the integrated air conditioner is placed, and it is desired to appropriately attach the drain hose to the drain pan under various situations.

[0005] The present invention has been made in view of the foregoing, and is intended to provide an integrated air conditioner configured such that a drain hose for draining drain water is properly attached to a drain pan under various situations.

{Solution to Problem}

[0006] An integrated air conditioner of the present invention includes a unit body configured such that an indoor unit and an outdoor unit are integrated together; a drain pan configured to store drain water drained from the indoor unit or the outdoor unit; and a hose socket configured to connect the drain pan to a drain hose configured to drain the drain water. The drain pan has a recess formed extending over bottom and back surfaces of the drain pan. The hose socket is disposed in the recess, and is obliquely disposed along a straight line which is non-parallel to the normal to the back surface.

[0007] According to the integrated air conditioner described above, the hose socket to be attached to the drain hose is disposed in the recess, and therefore, the drain hose can be properly placed so as not to protrude from either of the bottom surface or the back surface of the drain pan. Moreover, since the hose socket is obliquely disposed, the drain hose can be attached along the back surface of the drain pan in such a manner that the drain hose is merely bent at an angle greater than the right angle, and the drain hose can be easily attached without an additional joint for changing the direction of the drain hose. Thus, the drain hose can be attached to the drain pan depending on various situations.

[0008] The hose socket may be obliquely disposed such that a tip end of the hose socket is closer to the back surface than a base end of the hose socket is to the back surface.

[0009] According to the integrated air conditioner described above, the tip end of the hose socket faces the back surface of the drain pan, and therefore, the drain hose can be easily attached without the need to forcibly bend the drain hose when the drain hose is drawn from the recess toward the back-surface side.

[0010] The hose socket may be obliquely disposed such that the tip end of the hose socket is closer to the bottom surface than the base end of the hose socket is to the bottom surface.

[0011] According to the integrated air conditioner described above, the tip end of the hose socket faces the bottom surface of the drain pan, and therefore, the drain hose can be easily attached without the need to forcibly bend the drain hose when the drain hose is drawn from the recess toward the bottom-surface side.

[0012] The integrated air conditioner of the present invention further includes a fastener member. A screw hole is formed at an attachment surface of the recess on which the hose socket is provided. The fastener member is fastened into the screw hole to fix a bracket formed at the drain hose to the drain pan. In such a state, the screw hole is formed such that a straight line along which the screw hole extends does not intersect the drain pan.

[0013] According to the integrated air conditioner described above, the fastener member can be easily fastened to the drain pan with a straight screw driver, and therefore, workability in attaching the drain hose to the

drain pan can be improved.

{Advantageous Effects of Invention}

According to the integrated air conditioner of the present invention, the drain hose can be properly attached to the drain pan under various situations.

{Brief Description of Drawings}

[0014]

{Fig. 1}
Fig. 1 is a perspective view of an integrated air conditioner of an embodiment of the present invention.
{Fig. 2}
Fig. 2 is another perspective view of the integrated air conditioner of the embodiment of the present invention.
{Fig. 3}
Fig. 3 is a plan view illustrating a drain pan of Figs. 1 and 2.
{Fig. 4}
Fig. 4 is a side view illustrating the drain pan of Figs. 1 and 2.
{Fig. 5}
Fig. 5 is a bottom view illustrating the drain pan of Figs. 1 and 2.
{Fig. 6}
Fig. 6 is an enlarged partial perspective view illustrating a drain hose to be attached to the drain pan of Figs. 1 and 2.

{Description of Embodiments}

[0015] An embodiment of an integrated air conditioner of the present invention will be described below with reference to drawings. An integrated air conditioner 1 includes a unit body 2 and a drain pan 3. The unit body 2 is formed in the form of a rectangular housing such that the depth dimension is smaller than the vertical and horizontal dimensions. The unit body 2 is divided into upper and lower parts therein. An indoor unit 5 is disposed in the upper part, and an outdoor unit 6 is disposed in the lower part.

[0016] The unit body 2 further includes an air suction port 7 and an air discharge port 8. The air suction port 7 is formed so as to extend substantially across the entirety of an upper surface 11 of the unit body 2. The air discharge port 8 is formed slightly above the vertical center of a front surface 12 of the unit body 2 so as to extend substantially across the entire length of the unit body 2 in the horizontal direction thereof. The indoor unit 5 includes an indoor fan, an indoor air flow path, and an indoor heat exchanger which are not shown. The indoor fan sucks indoor air into the indoor air flow path through the air suction port 7. The indoor air flow path guides indoor air sucked through the air suction port 7 to the air discharge port 8. The indoor heat exchanger exchanges heat between indoor air flowing through the indoor air flow path and refrigerant circulating through the indoor unit 5 and the outdoor unit 6.

[0017] Moreover, the unit body 2 further includes, as illustrated in Fig. 2, an outdoor air suction port 14 and an outdoor air discharge port 15. The outdoor air suction port 14 and the outdoor air discharge port 15 are formed below the vertical center of a back surface 16 of the unit body 2 opposite to the front surface 12. The outdoor unit 6 includes an outdoor fan, an outdoor air flow path, an outdoor heat exchanger, and a compressor which are not shown. The outdoor fan sucks outdoor air from the outside of a room into the outdoor air flow path through the outdoor air suction port 14. The outdoor air flow path guides outdoor air sucked through the outdoor air suction port 14 to the outdoor air discharge port 15. The outdoor heat exchanger exchanges heat between outdoor air flowing through the outdoor air flow path and refrigerant circulating through the indoor unit 5 and the outdoor unit 6. A scroll compressor or a rotary compressor is used as the compressor, and the compressor compresses gas refrigerant guided from an evaporator.

[0018] The unit body 2 performs an air-cooling operation and an air-heating operation.

[0019] In the air-cooling operation, the unit body 2 causes the outdoor unit 6 operating as a condenser to suck outdoor air from the outside of the room through the outdoor air suction port 14 and to discharge the outdoor air heated by heat exchange between the outdoor air and refrigerant to the outside of the room through the outdoor air discharge port 15. The outdoor unit 6 also supplies the refrigerant cooled by the outdoor air to the indoor unit 5. The indoor unit 5 operates as an evaporator, and sucks indoor air through the air suction port 7 to discharge the indoor air, which is cooled by exchanging heat with the refrigerant cooled by the outdoor unit 6, to the room through the air discharge port 8. At this point, the indoor unit 5 drains drain water condensed by cooling of the indoor air.

[0020] In the air-heating operation, the unit body 2 causes the outdoor unit 6 operating as an evaporator to suck outdoor air through the outdoor air suction port 14 and to discharge the outdoor air cooled by heat exchange between the outdoor air and refrigerant to the outside of the room through the outdoor air discharge port 15. The outdoor unit 6 also supplies the refrigerant heated by the outdoor air to the indoor unit 5. The indoor unit 5 operates as a condenser, and sucks indoor air through the air suction port 7 to discharge the indoor air, which is heated by the refrigerant heated by the outdoor unit 6, to the room through the air discharge port 8. At this point, the outdoor unit 6 drains drain water condensed by cooling of the outdoor air, or drains water generated by defrosting of the heat exchanger of the outdoor unit 6.

[0021] The drain pan 3 is disposed on the lower side of the unit body 2. As viewed in the plane of Fig. 3, the drain pan 3 forms a storage tank 20 configured to store

drain water drained from the indoor unit 5 and drain water drained from the outdoor unit 6. The drain pan 3 has a back surface 21 formed substantially along the plane containing the back surface 16 of the unit body 2, and as viewed from the side in Fig. 4, has a bottom surface 22 formed on the side (lower side) opposite to the unit body 2. The drain pan 3 has a recess 23. The recess 23 is formed so as to extend over the back surface 21 and the bottom surface 22. That is, the recess 23 is formed at part of the boundary between the back surface 21 and the bottom surface 22.

[0022] The drain pan 3 includes a hose socket 24. The hose socket 24 is formed in a tubular shape. The hose socket 24 is disposed along an inclined straight line 28 in the recess 23 such that a tip end 27 of the hose socket 24 is closer to the bottom surface 22 than a base end 26 of the hose socket 24 bonded to an attachment surface 25 of the recess 23 is to the bottom surface 22. The hose socket 24 is, at a flow path formed therein, also connected to the storage tank 20 (see Fig. 3). The attachment surface 25 is formed perpendicularly to the straight line 28. That is, the attachment surface 25 is obliquely formed such that the angle between the attachment surface 25 and the back surface 21 is an angle other than the right angle. Moreover, the hose socket 24 is, as viewed from the bottom in Fig. 5, disposed such that the tip end 27 is closer to the back surface 21 than the base end 26 is to the back surface 21. That is, the attachment surface 25 is obliquely formed such that the angle between the attachment surface 25 and the bottom surface 22 is an angle other than the right angle.

[0023] Referring to Fig. 6, the drain pan 3 is connected to a drain hose 31 through the hose socket 24. The drain hose 31 is made of a flexible material, and a flow path through which drain water flows is formed in the drain hose 31. A bracket 32 is formed at one end of the drain hose 31. The bracket 32 is formed in a plate shape, and a through-hole 33 is formed at the bracket 32. A screw hole 34 is formed at the attachment surface 25 of the drain pan 3. The screw hole 34 is formed such that a straight line along the screw hole 34 is perpendicular to the attachment surface 25 and that a straight line extending outward from the screw hole 34 does not intersect the drain pan 3. The drain pan 3 further includes a screw 35. The screw 35 is fastened into the screw hole 34 with the screw 35 penetrating through the through-hole 33 of the bracket 32, thereby fixing the drain hose 31 to the drain pan 3.

[0024] According to the present embodiment, the above-described configuration achieves the following functions and advantages. In the case where the integrated air conditioner 1 is placed in a room, the integrated air conditioner 1 is disposed such that the back surface 16 of the unit body 2 faces a wall surface of the room and that the bottom surface 22 of the drain pan 3 faces the floor of the room. The hose socket 24 is inserted into the end of the drain hose 31 at which the bracket 32 is formed. Then, the screw 35 penetrating the through-hole 33 of the bracket 32 is fastened into the screw hole 34, thereby fixing the drain hose 31 to the drain pan 3. The end of the drain hose 31 opposite to the end attached to the drain pan 3 is disposed at drainage equipment. A bathroom is an example of the drainage equipment, and the drainage equipment drains drain water, which is supplied from the drain pan 3 through the drain hose 31, to the outside of the room.

[0025] In the foregoing situation, since the straight line extending outward from the screw hole 34 does not intersect the drain pan 3, the screw 35 can be easily fastened into the screw hole 34 with a straight screw driver in spite of the bracket 32 being disposed in the recess 23, and therefore, workability in attaching the drain hose 31 to the drain pan 3 can be improved.

[0026] Depending on the situation where the integrated air conditioner 1 is placed, the drain hose 31 is bent at part thereof disposed in the recess 23, and is drawn from the recess 23 through an opening of the recess 23 formed at the back surface 21 or through an opening of the recess 23 formed at the bottom surface 22. For example, the drain hose 31 is drawn from the recess 23 through the opening thereof formed at the bottom surface 22 when the back surface 16 of the unit body 2 is close enough to a wall surface, whereas the drain hose 31 is drawn from the recess 23 through the opening thereof formed at the back surface 21 when the bottom surface 22 of the drain pan 3 is close enough to the floor.

[0027] Since the integrated air conditioner 1 is configured such that the hose socket 24 is disposed in the recess 23 extending over the bottom surface 22 and the back surface 21 of the drain pan 3, the drain hose 31 can be, depending on the situation where the integrated air conditioner 1 is placed, appropriately placed such that the drain hose 31 does not protrude from either of the bottom surface 22 or the back surface 21 of the drain pan 3, i.e., the drain hose 31 is drawn from either of the bottom surface 22 or the back surface 21.

[0028] Moreover, since the integrated air conditioner 1 is configured such that the tip end 27 of the hose socket 24 is disposed closer to the back surface 21 than the base end 26 of the hose socket 24 is to the back surface 21, the degree of bending of part of the drain hose 31 disposed in the recess 23 can be reduced when the drain hose 31 is drawn from the back surface 21 of the drain pan 3. Thus, in the integrated air conditioner 1, the drain hose 31 can be, without using a pipe joint for bending the flow path or without the need to forcibly bend the drain hose 31, easily attached to the drain pan 3 such that the drain hose 31 is drawn from the back surface 21 of the drain pan 3.

[0029] Further, since the integrated air conditioner 1 is configured such that the tip end 27 of the hose socket 24 is disposed closer to the bottom surface 22 than the base end 26 of the hose socket 24 is to the bottom surface 22, the degree of bending of part of the drain hose 31 disposed in the recess 23 can be reduced when the drain hose 31 is drawn from the bottom surface 22 of the drain

pan 3. Thus, in the integrated air conditioner 1, the drain hose 31 can be, without using a pipe joint for bending the flow path or without the need to forcibly bend the drain hose 31, easily attached to the drain pan 3 such that the drain hose 31 is drawn from the bottom surface 22 of the drain pan 3.

[0030] Note that the present invention is not limited to the foregoing embodiment, and modifications can be suitably made without departing from the scope of the present invention. For example, the hose socket 24 may be disposed such that the distance between the base end 26 and the bottom surface 22 and the distance between the tip end 27 and the bottom surface 22 are substantially equal to each other, i.e., the straight line 28 along which the hose socket 24 extends parallel to the bottom surface 22 of the drain pan 3.

{Reference Signs List}

[0031]

1	Integrated Air Conditioner
2	Unit Body
3	Drain Pan
5	Indoor Unit
6	Outdoor Unit
20	Storage Tank
21	Back Surface
22	Bottom Surface
23	Recess
24	Hose Socket
25	Attachment Surface
26	Base End
27	Tip End
31	Drain Hose
32	Bracket
34	Screw Hole
35	Screw (Fastener Member)

Claims

1. An integrated air conditioner (1) **characterized in that** it comprises:

   a unit body (2) configured such that an indoor unit (5) and an outdoor unit (6) are integrated together;
   a drain pan (3) configured to store drain water drained from the indoor unit (5) or the outdoor unit (6); and
   a hose socket (24) configured to connect the drain pan (3) to a drain hose (31) configured to drain the drain water from the drain pan (3),
   wherein the drain pan (3) has a recess (23) formed extending over bottom (22) and back surfaces (21) of the drain pan (3), and
   the hose socket (24) is disposed in the recess (23), and is obliquely disposed along a straight line (28) which is non-parallel to a normal to the back surface (21).

2. The integrated air conditioner (1) according to claim 1, wherein
   the hose socket (24) is obliquely disposed such that a tip end (27) of the hose socket is closer to the back surface (21) than a base end (26) of the hose socket (24) is to the back surface (21).

3. The integrated air conditioner (1) according to claim 1 or 2, wherein
   the hose socket (24) is obliquely disposed such that the tip end (27) of the hose socket (24) is closer to the bottom surface (22) than the base end (26) of the hose socket (24) is to the bottom surface (22).

4. The integrated air conditioner (1) according to any one of claims 1 to 3, further comprising:

   a fastener member (35),
   wherein a screw hole (34) is formed at an attachment surface (25) of the recess (23) on which the hose socket (24) is provided,
   the fastener member (35) is fastened into the screw hole (34) to fix a bracket (32) formed at the drain hose (31) to the drain pan (3), and
   the screw hole (34) is formed such that a straight line along which the screw hole (34) extends does not intersect the drain pan (3).

FIG. 1

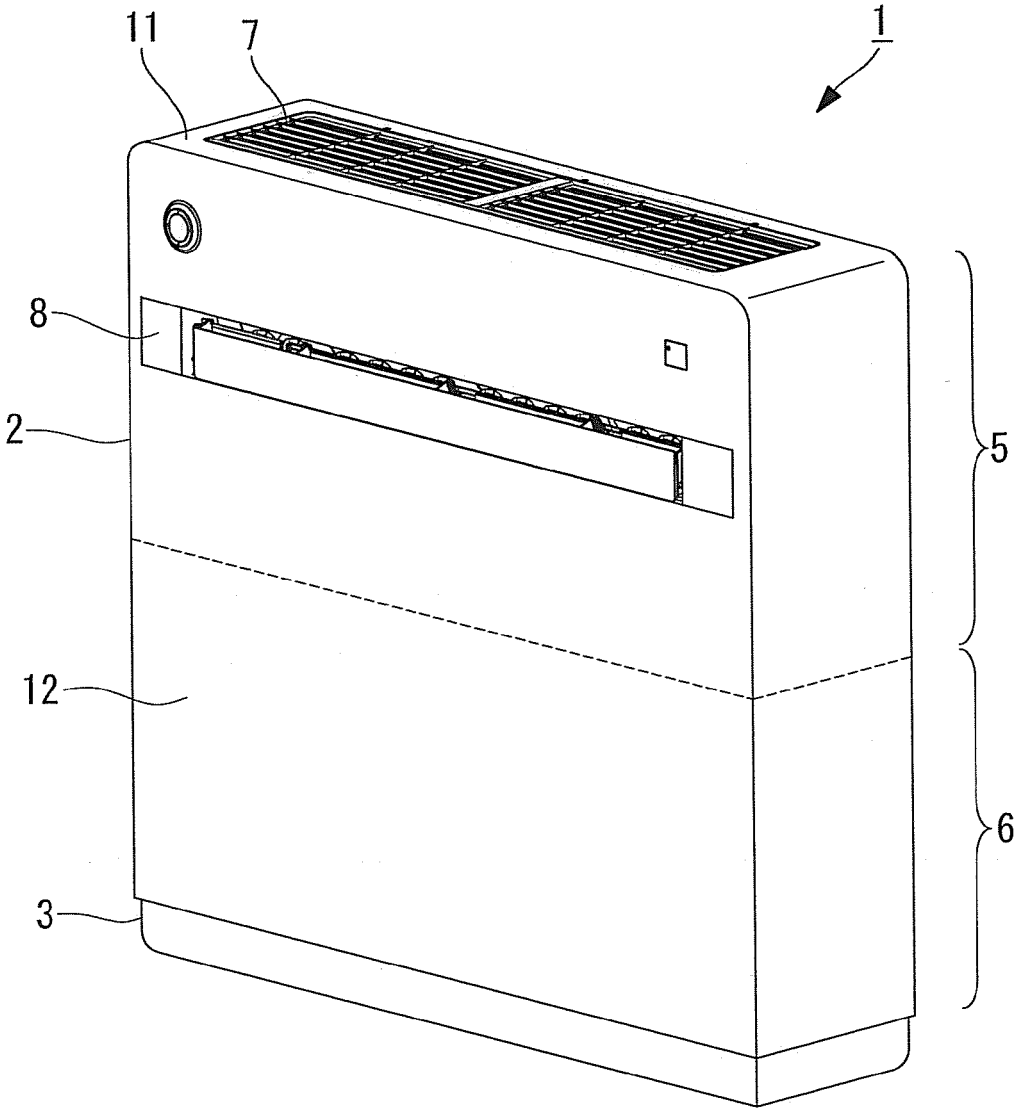


FIG. 2

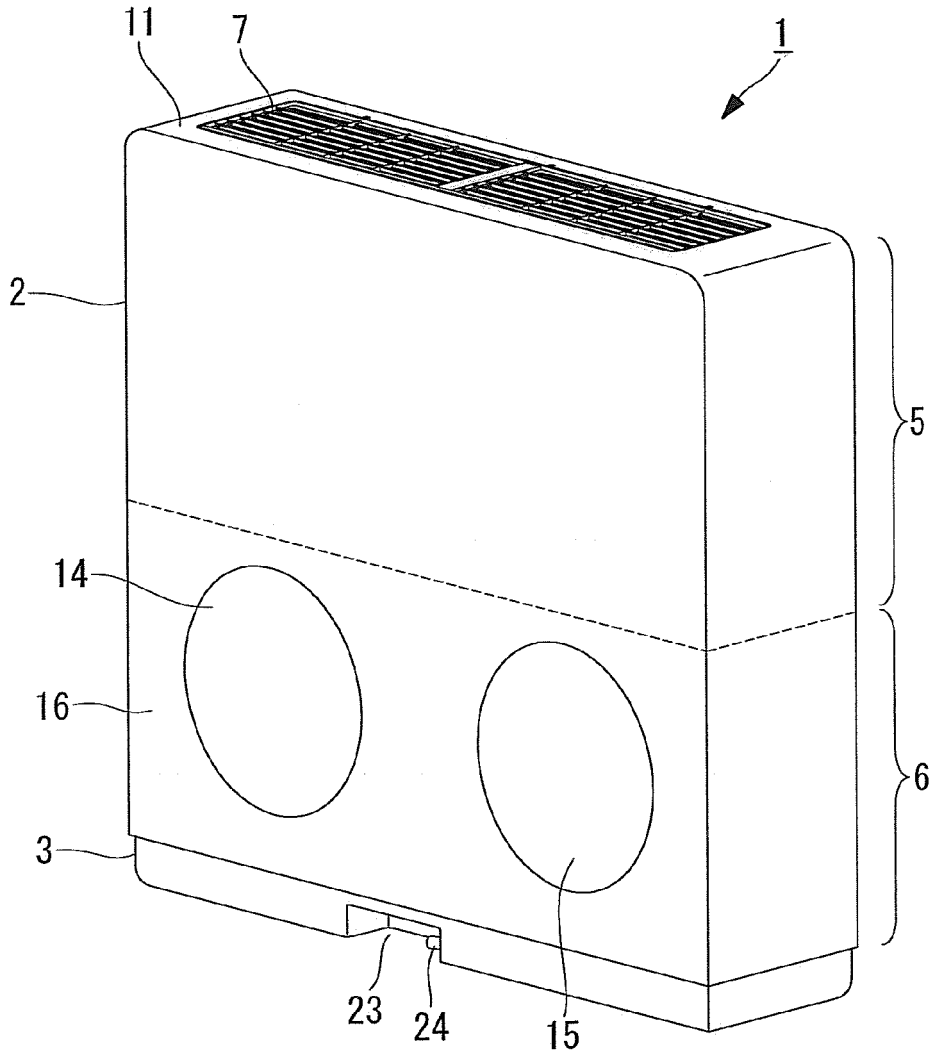


FIG. 3

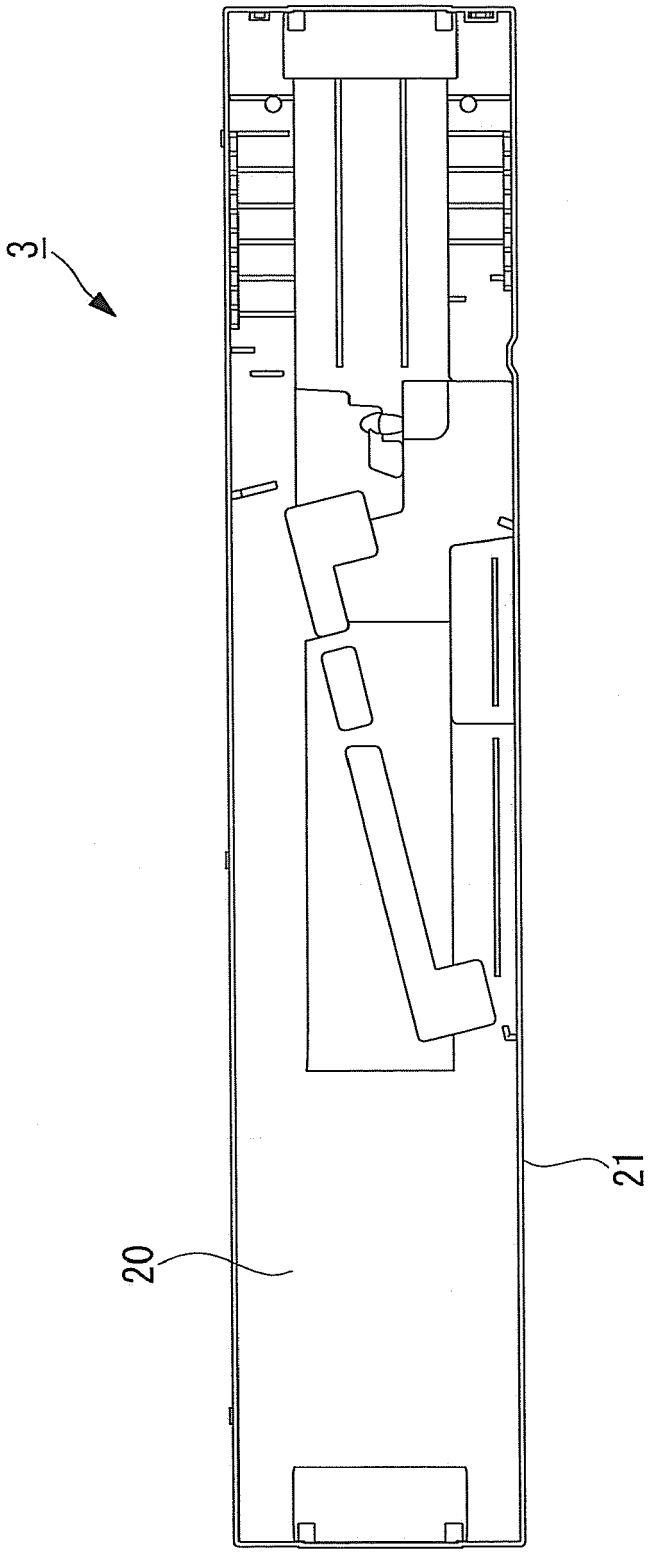


FIG. 4

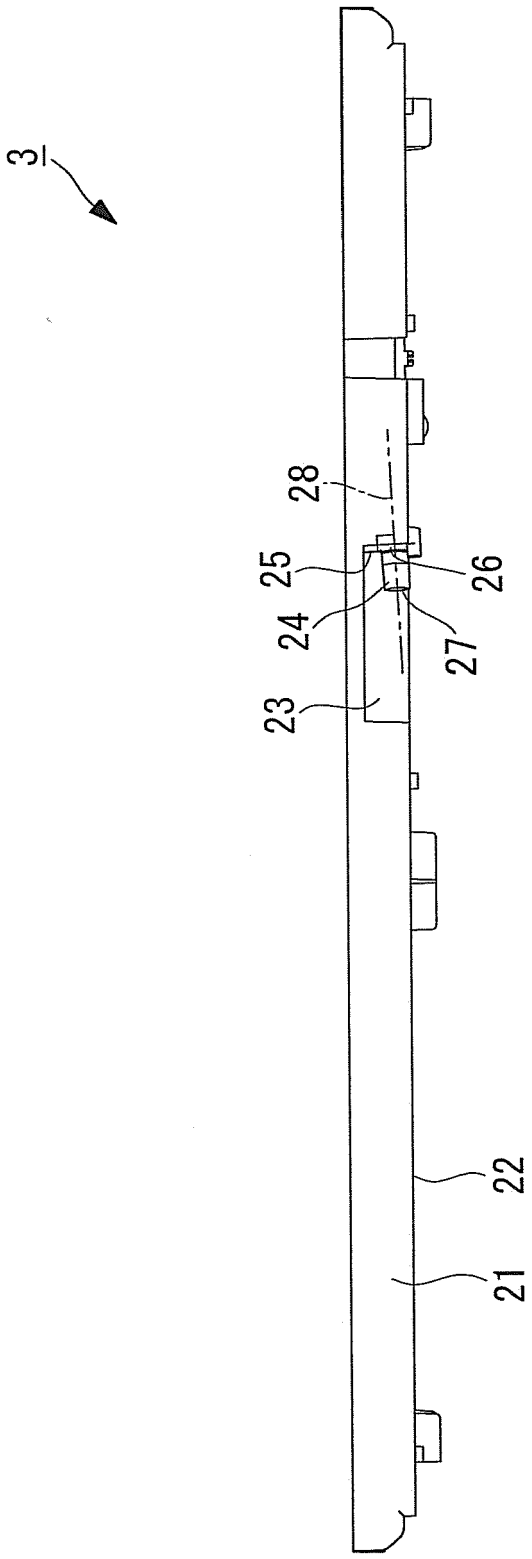


FIG. 5

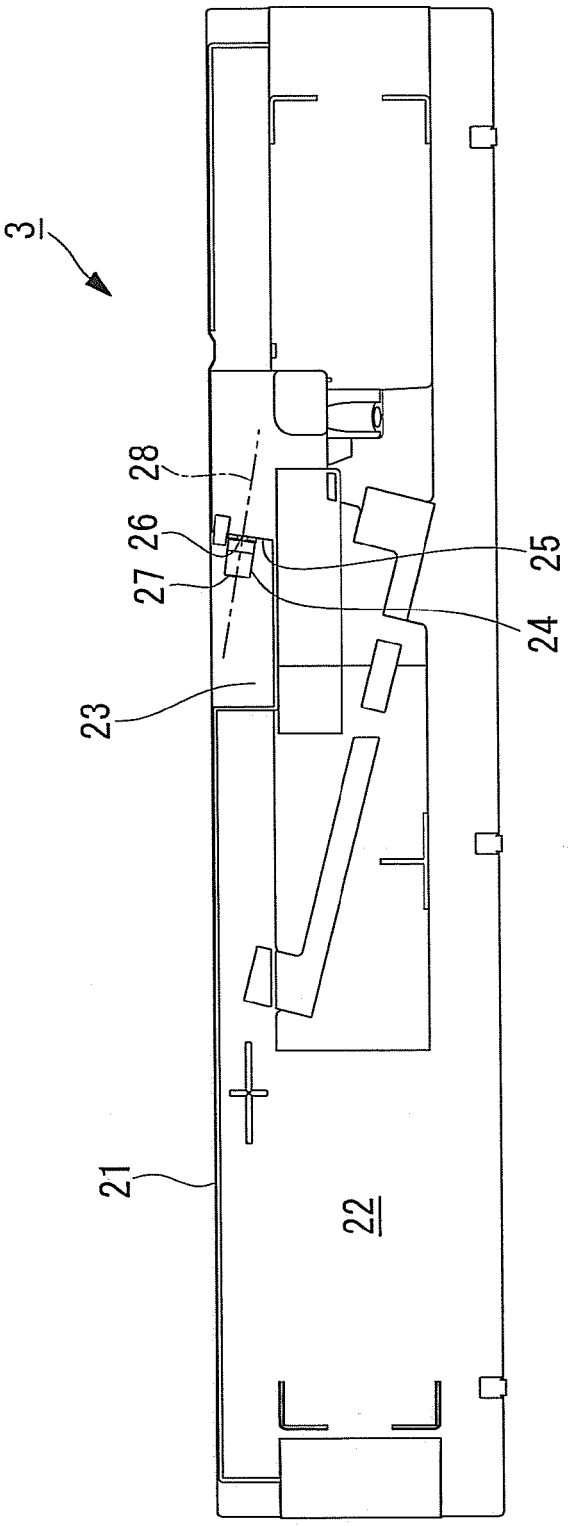
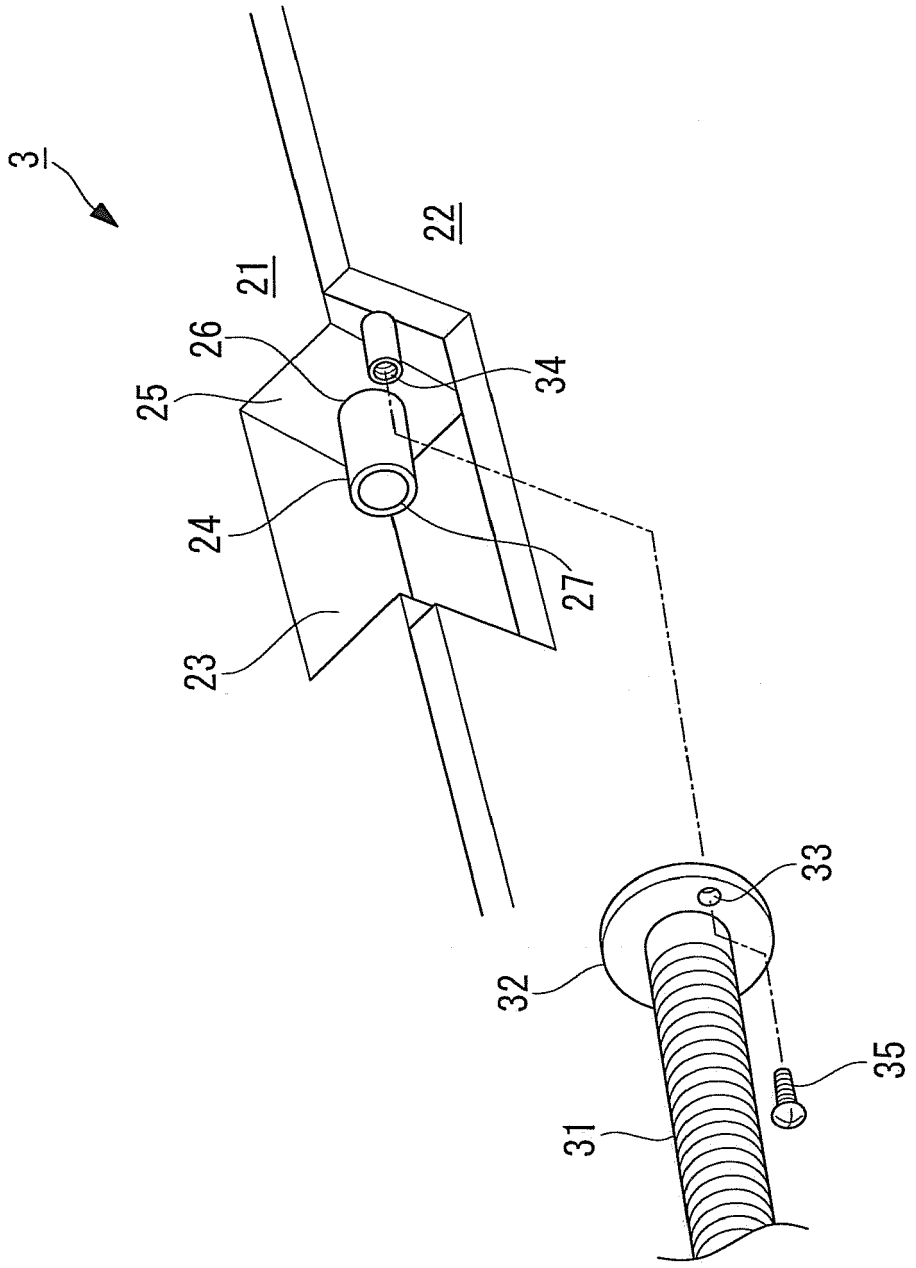


FIG. 6



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EUROPEAN SEARCH REPORT

Application Number
EP 15 15 7932

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC) F24F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 July 2015	Valenza, Davide

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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